

5.2 IDENTIFICATION OF NATURAL HAZARDS OF CONCERN

To provide a strong foundation for mitigation strategies considered in Sections 6 and 9, Tioga County considered a full range of natural hazards that could impact the area, and then identified and ranked those hazards that presented the greatest concern. The natural hazard of concern identification process incorporated input from the County and participating jurisdictions; review of the 2006 Tioga County Hazard Mitigation Plan; review of the 2011 New York State Hazard Mitigation Plan (NYS HMP) and previous hazard identification efforts; research and local, state, and federal information on the frequency, magnitude, and costs associated with the various hazards that have previously, or could feasibly, impact the region; and qualitative or anecdotal information regarding natural hazards and the perceived vulnerability of the study area’s assets to them. Table 5.2-1 documents the process of identifying the natural hazards of concern for further profiling and evaluation.

Hazards of Concern is defined as those hazards that are considered most likely to impact a community. These are identified using available data and local knowledge.

For the purposes of this planning effort, the Planning Committee chose to group some natural hazards together, based on the similarity of hazard events, their typical concurrence or their impacts, consideration of how hazards have been grouped in Federal Emergency Management Agency (FEMA) guidance documents (FEMA 386-1, “Understanding Your Risks, Identifying Hazards and Estimating Losses; FEMA’s “Multi-Hazard Identification and Risk Assessment – The Cornerstone of the National Mitigation Strategy”), and consideration of hazard grouping in the NYS HMP.

The “Flood” hazard includes riverine, flash, ice jam, and dam break flooding. Other types of flooding such as coastal or urban drainage do not generally occur within the County; therefore, they were not further considered for inclusion within this HMP. Inclusion of the various forms of flooding under a general “Flood” hazard is consistent with that used in FEMA’s “Multi-Hazard Identification and Risk Assessment” guidance.

The “Severe Storm” hazard includes windstorms that often entail a variety of other influencing weather conditions including thunderstorms, hail, lightning and tornadoes. Since tropical disturbances are identified as a type of severe storm event, this hazard also includes tropical cyclone events (hurricanes, tropical storms and tropical depressions). Tropical cyclones were not grouped as a separate hazard, because the County felt that these types of events do not directly impact the County on a frequent basis and that exposure and risk of such events are minimal in comparison to communities along the New York coastline.

The “Severe Winter Storm” hazard includes heavy snowfall, blizzards, freezing rain/sleet, hail, ice storms and extra-tropical cyclones (Nor’easters and severe winter low-pressure systems). Extra-tropical events generally occur during winter weather months; therefore, for the purpose of this HMP, all such events are to be grouped within this hazard. Although not all extra-tropical events, such as nor’easters, occur during the winter, they will remain grouped within this hazard category to avoid duplication of events in hazard profiles.

These groupings do not change the definition of the included specific events/hazards, as defined within FEMA guidance and other risk assessment documents, and do not affect the hazard analysis conducted through the use of HAZUS-MH, either directly or as a risk assessment support tool.

Please note that technological (for example, hazardous material incidents) and man-made hazards (for example, terrorism) are not being addressed in this planning process. The DMA 2000 regulations do not require consideration of such hazards and due to limited funding, these were not chosen for inclusion in

this plan by the County and planning participants. The County may attempt to expand the scope of this HMP to include other less frequent natural hazards and/or technological (hazardous material incidents) and man-made (terrorism, man-made dam breaches/failures) hazards as resources permit.

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Table 5.2-1. Identification of Natural Hazards of Concern for Tioga County, New York

Hazard	Step 1	Step 2	Step 3	
	Is this a hazard that may occur in Tioga County?	If yes, does this hazard pose a significant threat to Tioga County?	Why was this determination made?	Source(s)
Avalanche	No	No	<ul style="list-style-type: none"> The NYS HMP does not identify avalanche as a hazard of concern for New York State. The topography and climate of Tioga County does not readily support the occurrence of an avalanche event. New York State in general has a very low occurrence of avalanche events based on statistics provided by National Avalanche Center – American Avalanche Association (NAC-AAA) between 1950 and 2006. 	<ul style="list-style-type: none"> NYSDPC Review of NAC-AAA database between 1950 and 2006
Coastal Erosion / Coastal Storm	No	No	<ul style="list-style-type: none"> Tioga County is not bounded by coastal waters; therefore, not directly impacted by coastal storms that result in coastal erosion. 	<ul style="list-style-type: none"> NYSDPC
Drought	Yes	Yes	<ul style="list-style-type: none"> The NYS HMP identifies drought and extreme heat events as hazards of concern for New York State. Tioga County is located within the Eastern Plateau Climate Division. Between 1895 and 2002, 27 severe or extreme drought events occurred in this climate division. These events include: <ul style="list-style-type: none"> September – November 1895 November – December 1899 August 1900 – February 1901 November 1908 – January 1909 August 1909 – January 1910 July 1910 – September 1911 August – September 1913 October – December 1914 April – June 1915 November – December 1916 September 1921 – February 1922 November – December 1922 May 1923 – January 1924 August 1930 – June 1931 November – December 1931 May 1923 – January 1924 August 1930 – June 1931 November – December 1931 August 1939 – February 1940 May – June 1941 	<ul style="list-style-type: none"> NRCC NYSDPC NOAA-NCDC Drought Reporter SHELDUS National Atlas



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			<ul style="list-style-type: none"> o September 1941 – April 1942 o August 1964 – February 1966 o July – August 1966 o October – November 1966 o January – February 1967 o August – September 1995 o November 2001 – January 2002 • Various sources indicated that many drought events or periods impacted large regions of the State, including Tioga County. Such events include: <ul style="list-style-type: none"> o June – July 1988 - \$33 K in property damage; \$1.8 M in crop damage o September 1999 – over \$2.9 M in crop damage o August 2005 – corn crops and hay crops are half of normal; pastures are gone o July – Aug. 2011 – SBA loans available due to drought 	
Earthquake	Yes	Yes	<ul style="list-style-type: none"> • The NYS HMP identifies earthquake as a hazard of concern for New York State. Areas within the State with a higher seismic risk include; The North and Northeast third (1/3) of the State (The North Country/Adirondack Region including a portion of the Greater Albany-Saratoga region), the Southeast corner (including the greater New York City area and western Long Island), and the Northwest corner (including the City of Buffalo and vicinity) of the State, in that order from higher to lower. • According to the USGS online seismic hazard maps, the peak ground acceleration with a 10% probability of exceedance over 50 years for Tioga County is between 2 and 3% g. FEMA guidance recommends earthquakes are evaluated further if an area has a 3% g peak acceleration or more. 	<ul style="list-style-type: none"> • NYSDPC • NOAA-NGDC • USGS • National Atlas
Expansive Soils	No	No	<ul style="list-style-type: none"> • The NYS HMP identifies expansive soils as a hazard of concern for New York State. • USGS indicated that Tioga County’s soils consist of clay having slight to moderate swelling potential • Due to the fact that this hazard has no known historical occurrences, the County decided not to analyze the expansive soils hazard for the purpose of this Plan. 	<ul style="list-style-type: none"> • NYSDPC • USGS
Extreme Temperature	Yes	No	<ul style="list-style-type: none"> • Extreme temperature was not identified as a hazard in the NYS Plan. • NOAA’s NCDC storm events database indicates that Tioga County was impacted by approximately 19 extreme events between 1950 and 2011. 	<ul style="list-style-type: none"> • NYSDPC • NOAA-NCDC • National Atlas



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			However, most events are of a regional extent rather than localized to just one county or community. The County decided to combine the extreme temperature hazard with the Drought Hazard (in the case of extreme heat) and Severe Winter Storm (in the case of extreme cold temperatures) due to the limited available impact data for this hazard.	
Flood (Riverine, Flash, Ice Jam and Dam Flooding)	Yes	Yes	<ul style="list-style-type: none"> The NYS HMP identifies flooding as the main hazard of concern for New York State. The NYS HMP, NYSOEM, and FEMA indicated that Tioga County has been issued eight FEMA Disaster Declarations for flood-related events (some also identified as flooding events). <ul style="list-style-type: none"> FEMA-DR-487 – 1975 – Severe storms, heavy rain, landslides and flooding FEMA-DR-515 – 1976 – Severe storms, flooding FEMA-DR-1095 – 1996 – Severe storms, flooding FEMA-DR-1233 – 1998 – Severe storms, flooding FEMA-DR-1589 – 2005 – Severe storms and flooding FEMA-DR-1650 – 2006 – Severe storms and flooding FEMA-DR-1670 – 2006 – Severe storms and flooding FEMA-DR-1993 – 2011 – Severe storms, flooding, straight-line winds NOAA's NCDC storm events database indicates that Tioga County was impacted by approximately 71 flood events between 1950 and 2011. This includes flash flooding. The 2010 NYS HMP indicated that Tioga County has been ranked as the 12th most flood vulnerable county in New York State based on potential flood exposure and vulnerability to loss. NFIP identifies that Tioga County has made 1,540 flood claims between January 1, 1978 and December 31, 2011, receiving \$ 46,577,191.18 in total payments. Ice Jams are mentioned separately in this Table but are grouped with the Flood hazard in this plan (see below). 	<ul style="list-style-type: none"> NYSDPC FEMA NYSOEM SHELDUS NOAA-NCDC NFIP
Hailstorm	Yes	Yes	Please see Severe Storm	
Hurricane (and other Tropical Cyclones)	Yes	Yes	Please see Severe Storm	



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Ice Jams (categorized as a Flood hazard in this HMP)	Yes	Yes	<ul style="list-style-type: none"> The NYS HMP identifies ice jam flooding as a hazard of concern for New York State (grouped as a type of flood). New York State ranks 2nd in the Nation for total number of ice jam events, with over 1,500 incidents documented between 1857 and 2010. The USACE CRREL Ice Jam Database, NYS HMP and various other sources, indicates that three reported ice jam events have occurred within Tioga County between 1857 and 2010. Major events include those that occurred on: <ul style="list-style-type: none"> January 22, 1959 – Dean Creek January 19, 1996 – Owego Creek March 6, 2007 – Susquehanna River 	<ul style="list-style-type: none"> NYSDPC USACE CRREL Ice Jam Database
Ice Storm	Yes	Yes	Please see Severe Winter Storm	
Infestation	No	No	<ul style="list-style-type: none"> The NYS HMP does not identify infestation as a hazard of concern for New York State. Based on all sources reviewed, no known significant occurrences are reported for Tioga County 	<ul style="list-style-type: none"> NYSDPC USGS NYSDEC
Land Subsidence	Yes	No	<ul style="list-style-type: none"> The NYS HMP indicates that New York State is vulnerable to land subsidence; however, this hazard is “extremely localized” and poses a “very low risk to population and property.” The NYS HMP does not identify Tioga County as a County that has experienced land subsidence in the past. According to USGS, Tioga County is not made up of unconsolidated aquifer systems, hence it is unlikely that there will be permanent subsidence and related ground failures. Due to the fact that this hazard has a low occurrence of incidents and that the County could not quantify significant losses to the County and/or municipalities from historic events, the land subsidence hazard will not be analyzed for the purposes of this Plan. 	<ul style="list-style-type: none"> NYSDPC USGS
Landslide	Yes	No	<ul style="list-style-type: none"> The NYS HMP identifies landslide as a hazard of concern for New York State, with Tioga County located in a low landslide incidence area. The NYS HMP indicates that Tioga County has had 12 landslide occurrences from 1837 to 2007. The NYS HMP listed Tioga County as the 37th County in the State most threatened by and vulnerable to landslides and landslide losses. According to National Atlas, a majority of Tioga County has a low landslide incidence. However, the southeastern corner of the County has a moderate landslide incidence and moderate susceptibility to landslide/low incidence. 	<ul style="list-style-type: none"> NYSDPC USGS National Atlas



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			<ul style="list-style-type: none"> Due to the fact that this hazard has a low occurrence of incidents and that the County could not quantify significant losses to the County and/or municipalities from historic events, the landslide hazard will not be analyzed for the purposes of this Plan. 	
Nor'Easters	Yes	Yes	Please see Severe Winter Storm	
Severe Storm (Windstorms, Thunderstorms, Hail, Lightning, Tornadoes and Hurricanes)	Yes	Yes	<ul style="list-style-type: none"> The NYS HMP identifies all types of severe storms as hazards of concern for New York State. Tioga County has experienced six tornado events. NYS HMP listed Tioga County as the 36th county in the State most threatened by and vulnerable to extreme wind and wind losses. The NYS HMP, NYSOEM, and FEMA indicated that Tioga County has been issued 13 FEMA Disaster Declarations for severe storm events (some also identified as flooding events). <ul style="list-style-type: none"> FEMA-DR-338 – 1972 – Tropical Storm Agnes FEMA-DR-487 – 1975 – Severe storms, heavy rain, landslides and flooding FEMA-DR-515 – 1976 – Severe storms, flooding FEMA-DR-1095 – 1996 – Severe storms, flooding FEMA-DR-1233 – 1998 – Severe storms, flooding FEMA-DR-1335 – 2000 – Severe storms FEMA-DR-1565 – 2004 – Tropical Depression Ivan FEMA-DR-1589 – 2005 – Severe storms and flooding FEMA-DR-1650 – 2006 – Severe storms and flooding FEMA-DR-1670 – 2006 – Severe storms and flooding FEMA-DR-1993 – 2011 – Severe storms, flooding, straight-line winds FEMA-EM-3341 – 2011 – Remnants of Tropical Storm Lee FEMA-DR-4031 – 2011 – Remnants of Tropical Storm Lee NOAA's NCDC storm events database indicates that Tioga County was impacted by approximately 218 severe storm events between 1950 and 2011. According to SHELDUS, Tioga County has experienced six tornadoes, between 1960 and 2010, that totaled \$1.7 M in property damages. 	<ul style="list-style-type: none"> NYSDPC NYSOEM FEMA SHELDUS NOAA-NCDC
Severe Winter Storm (Heavy Snow, Blizzards,	Yes	Yes	<ul style="list-style-type: none"> The NYS HMP identifies all types of severe winter storms as hazards of concern for New York State. The NYSDPC listed Tioga County as the 58th County in the State most threatened by and vulnerable to snow and snow loss, with an annual average snowfall 61.5 inches. Tioga County is also 	<ul style="list-style-type: none"> NYSDPC FEMA NOAA-NCDC SHELDUS



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Freezing Rain/Sleet, Ice Storms, and Nor'Easters)			listed as the 55 th County in New York State most threatened by and vulnerable to ice storms and ice storm loss. <ul style="list-style-type: none"> The NYS HMP, NYSOEM, and FEMA indicated that Tioga County has been issued one FEMA Emergency Declaration for winter storm event: <ul style="list-style-type: none"> FEMA-EM-3173 – 2003 - Snowstorm NOAA's NCDC storm events database indicates that Tioga County was impacted by approximately 73 winter storm events between 1950 and 2011. However, most events are of a regional extent rather than localized to just one county or community. 	<ul style="list-style-type: none"> NYSOEM
Tornado	Yes	Yes	Please see Severe Storm	
Tsunami	No	No	<ul style="list-style-type: none"> Tsunami is not identified as a hazard of concern in the NYS HMP 	<ul style="list-style-type: none"> NYSDPC
Volcano	No	No	<ul style="list-style-type: none"> Volcanoes are not identified as a hazard of concern in the NYS HMP, because there are no known volcanoes located in the state. 	<ul style="list-style-type: none"> NYSDPC
Wildfire	Yes	No	<ul style="list-style-type: none"> The NYS HMP identifies wildfires as hazards of concern for New York State. GeoMAC indicates that portions of Tioga County are located within the Wildland-Urban Interface. USGS indicates that no wildfires greater than 250 acres were experienced in Tioga County between 1980 and 2003. GeoMAC indicates that no wildfires were experienced in Tioga County between 2001 and 2011. Due to the fact that this hazard has a low occurrence of incidents and that the county could not quantify significant losses to the County and/or municipalities from historic events, the County decided not to analyze the wildfire hazard for the purposes of this plan. 	<ul style="list-style-type: none"> NYSDPC USGS GeoMAC National Atlas
Windstorm	Yes	Yes	Please see Severe Storm	

CRREL	Cold Regions Research and Engineering Laboratory	NYCEM	New York City Area Consortium For Earthquake Loss Mitigation
DR	Presidential Disaster Declaration Number	NYS	New York State
EM	Presidential Emergency Declaration	NYSDEC	New York State Department of Environmental Conservation
FEMA	Federal Emergency Management Agency	NYSDPC	New York State Disaster Preparedness Commission
GeoMAC	Geospatial Multi-Agency Coordination Group	NYSOEM	New York State Office of Emergency Management
HMP	Hazard Mitigation Plan	SHELDUS	Spatial Hazard Events and Losses Database for the United States
NCDC	National Climatic Data Center	USACE	U.S. Army Corp of Engineers
NOAA	National Oceanic and Atmospheric Administration	USGS	U.S. Geologic Survey
NWS	National Weather Service		



According to input from Tioga County, and review of all available resources, a total of five natural hazards of concern were identified as significant hazards affecting the County, to be addressed within this plan:

- Drought
- Earthquake
- Flooding (riverine, flash, ice jam, and dam)
- Severe Storm (windstorms, thunderstorms, hail, tornadoes and hurricanes/tropical storms)
- Severe Winter Storm (heavy snow, blizzards, ice storms, Nor'Easters)

Other natural hazards of concern have occurred within the County, but typically have a low potential to result in significant impacts. The County deemed other natural hazards as minor in comparison to those bulleted above; therefore, additional natural hazards will not be further addressed within this version of the Plan. However, if deemed necessary by the County, these hazards may be considered in future versions of the Plan.